

REMARKS/ARGUMENTS

Reconsideration by the Examiner and withdrawal of the rejection are respectfully solicited.

In the Final Rejection, claims 1-3 and 6-10 were rejected in a new ground of rejection under 35 U.S.C. §103(a) as being unpatentable over Graves et al. U.S. Patent No. 6,874,879 in view of Albertinetti et al. U.S. Patent No. 4,257,686. The rejection notes that Graves discloses a bimorph mirror presenting first and second layers of piezoelectric ceramic (30 and 32) together with at least one electrode serving to vary at least one curvature of the mirror as a function of electrical voltage applied to the piezoelectric ceramics. In reading the Graves structure on the structure recited in Claim 1, the rejection notes that Graves has a central core defined by layers 34 and 36 which forms a semi-rigid beam. The rejection further states that the thickness of the central core lies in the range of 1 mm to 80 mm, citing column 4, lines 52-63.

The rejection acknowledges that the two layers of Graves do not have opposed polarities, but the rejection contends that to have two layers of opposed polarities would have been obvious in view of Albertinetti.

This rejection is fundamentally flawed in several respects. The Examiner has failed to establish a prima facie case of obviousness. Accordingly, the rejection should be withdrawn.

It should be noted that the layers 34, 36 which the Examiner contends correspond to the claimed central core of material forming a semi-rigid beam are in fact layers of gold or other highly conductive material. As was noted in the previous response, persons skilled in the art would recognize that gold layers would be very thin, typically about 0.2 microns, which is quite far away from the minimum value of 1 mm set forth in the claim.

Furthermore, the passage which the Examiner cites for teaching the claimed core thickness of 1 mm to 80 mm is in fact referring to the piezoelectric plates 30, 32 and not to the layers 34, 36 that are between these plates. This distinction was made in the remarks accompanying the previous response, but it appears that it was overlooked or ignored by the Examiner.

The obviousness rejection is also flawed in that there is no proper motivation for combining the teachings of Albertinetti with Graves. Moreover, persons of ordinary skill in the art would immediately recognize that the teachings are incompatible with one another. Graves teaches using unipolar wiring, as can be clearly seen from the title of the patent. However, unipolar wiring is incompatible with the use piezoelectric layers of opposite polarities. The opposite deformation of the layers would cancel out. Therefore, it is not possible to use piezoelectric layers of opposite polarities in the deformable mirror of Graves.

Furthermore, it would not have been obvious to modify the Graves structure by providing bipolar wiring, since this would be in direct conflict with the stated objective of the Graves et al. invention, which is to use a unipolar voltage source. At column 1 line 67 to column 2 line 10 Graves et al. state as follows:

However, voltage sources that are capable of providing bipolar voltages (both positive and negative) are expensive. In addition, the electro-restrictive materials have a polarity, meaning that they respond better to voltage of one polarity. When the voltage of the reverse polarity is applied, the electro-restrictive material performs more poorly and may even be damaged so as to lose its electro-restrictive properties. Therefore, it is desirable to provide a deformable mirror that uses unipolar voltage sources (either positive or negative) to control the deformation of the mirror.

In view of this explicit teaching about the disadvantages and problems associated with bipolar wiring, and the desirability of using unipolar voltage sources, it should be quite clear that there is no proper basis to modify the Graves structure to provide bipolar wiring.

For these reasons, the invention defined by Claims 1-3 and 6-10 patentably distinguishes over Graves, Albertinetti, or any combination of these references.

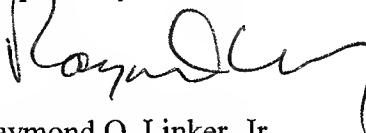
Claims 4 and 5 have been rejected over the combination of Graves and Albertinetti, and further in view of Michelet, et al., U.S. Patent No. 4,298,247. The Examiner cites Michelet for its disclosure at column 2, line 53 of two layers being separated by a silicon material. However, this passage from Michelet refers not to the chemical element silicon, which is represented by the symbol Si in the periodic table of elements. Rather, he refers to a silicone elastomer. A silicone elastomer is a polymeric material and is quite different both chemically and physically from the chemical element silicon.

As noted earlier, the layers 34 and 36 in Graves are made of gold or other highly conductive material. They must be electrically conductive in order to form an electrical contact with the PZT plates 30 and 32. Claim 4 specifies that the central core is constituted by a material selected from glass and silica. Both of these are known as insulating materials. They are not electrically conductive. There would be no reason to modify the Graves structure in such a way as to make the layers 34 and 36 from glass or silica. Therefore, the subject matter of Claim 4 is both novel and non-obvious from the cited prior art.

Claim 5 specifies that the first and second layers of piezoelectric ceramic are sandwiched between skin layers of glass or of silicon. As noted in the previous paragraph, the Michelet teaching of a silicone elastomer does not meet the limitations specified in Claim 5.

For the reasons noted, Applicant submits that the invention defined in Claims 1-10 of record is both novel and non-obvious with respect to the cited prior art. Reconsideration by the Examiner, withdrawal of the rejection and formal notification of the allowance of Claims 1-10 are respectfully solicited.

Respectfully submitted,



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